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approach

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Publish or Perish in Naval Aviation

Professional writing is one of the things that defines an occupation as a profession. Unfortunately, we in naval aviation, as a group, don't write about our vocation very well or very often. The ratio of good articles to gold wings makes it obvious that the few write for the many. Although not specifically targeted at aviation, the new correspondence manual and some well-publicized notes from senior flag officers on the topic of clear writing make it plain that there are writing deficiencies service-wide. At least one command has opted to take the lead in correcting this problem.

About a year ago, Cdr. H.D. Connell, then XO of VA-27, an A-7 squadron based at NAS Lemoore, started a program to improve the level of communication skills in his command. It began with a series of lectures on verbal and non-verbal communication for the officers. Then, each officer was required to submit one article per quarter on any professional topic. An editorial board appointed by the command evaluates each effort. The board either returns the article for rewriting or sends it on to an appropriate professional publication. Many of these articles have appeared in Approach, as well as Navy Lifeline, Mech, Proceedings, Tac Attack and others.

Connell, now CO, admits the program met with plenty of resistance at first and that some of his officers still balk at it. But the benefits have been considerable. The quality of writing produced by VA-27 officers has improved dramatically. Since many of the articles are safety-related, the squadron's safety awareness has improved also. Furthermore, the command has received some well-deserved publicity. But most of the benefits go beyond VA-27 itself.

VA-27 alumni are better writers for the experience, no matter what they go on to do. The lessons learned by one command in one year have been shared throughout the service, where its successes can be copied and its mistakes can be avoided. And naval aviation, I think, is more professional for it.

John Flynn
Editor

inside approach

Vol. 30 No. 5

An A-6E of VA-128 during carrier qualification training aboard USS *Lexington* (CVT 16). (Photo by Peter Mersky)

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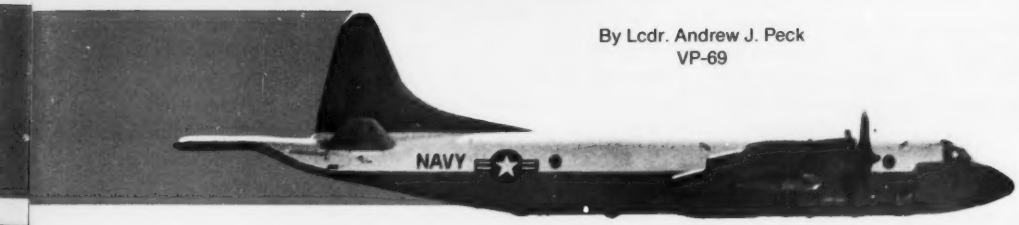
'Ya Can't Fly

' Without Gouge'



By Lcdr. Andrew J. Peck
VP-69

EVER since we first learned the term from our classmates while studying for tests at Pensacola, the concept of "gouge" has been an integral part of our lives in naval aviation. Everyone, it seems, wants their more experienced or knowledgeable squadron mates to divulge the secrets of success for passing NATOPS exams, getting "Sats" on Admats or being the best pilot/NFO/aircrewman this Navy has ever known. "Gouge," like "geedunk" and "scuttlebutt," is a term which is extremely versatile and an essential element of vocabulary for those of us who spend time near saltwater. As an airline captain in civilian life, I have sometimes found it difficult to convey the valuable concept of "gouge" to first officers (copilots) who do not have a Navy background. It seems that we who wear "sailor suits" truly have a language of our own.

While some may not agree that "gouge" is a *sine qua non* for aviation, I have certainly found that it makes flying safer, easier and more efficient. Here is a list of "gouge" rules I have acquired in my 14 years of experience as a Navy and civilian pilot. I have found that many pilots (civil and military) are not aware of their existence. It should be noted that these are usually approximations of the exact values and that they are intended only as rules of thumb. The exact numbers for most of these rules are available in reference publications such as FLIP manuals, Airman's Information Manual, Instrument NATOPS, FAA Instrument Flying Handbook, etc. These books are always appropriate professional reading.

Please don't reject these rules of thumb as being relevant only for P-3s or by saying "How can I possibly remember all of them?" I assure you that I know each one and that I use them in my daily flying. I found them just as valuable when I was flying helicopters as I now do in P-3s and civilian airline flying. I have considerable single-pilot IFR experience and have found that they decreased my workload significantly. My admonition to you as fellow professional pilots is "Try it, you'll like it!" Here goes.

Speeds

• TAS = IAS x [1 + (.02 x altitude ÷ 1,000)] or, more simply, TAS increases 2 percent for each 1,000 feet of altitude.

• Diameter of a standard rate turn (three degrees per second) in nautical miles = TAS ÷ 100 (nice to know for circling approaches).

Example: Diameter of a SRT @ 200 KTAS is about two nm.

• Angle of bank for SRT = 15 percent of TAS, or 1/10 of TAS, plus one-half of that number.

Example: 100 KTAS requires 15 degrees bank, 180 KTAS requires 27 degrees bank.

• Speed of sound = $39\sqrt{\text{temperature in °Kelvin}}$ (this is useful in computing your Mach number). If you're not a physics major, °Kelvin = °C + 273

Example: Speed of sound at -30°C = 608 knots.

• Speed of sound decreases 24 knots per 10,000 feet of altitude (actual range is 23 — 26 knots). This assumes an ISA lapse rate.

Example: Climb 4,000 feet and SOS will decrease 9.6 knots (with ISA lapse rate).

• Speed for tire hydroplaning = $9\sqrt{\text{tire pressure}}$.

Example: Tire pressure is 100 psi; tires will begin to hydroplane at about 90 knots ground speed. This is for your normal, everyday, garden variety of hydroplaning (dynamic) and does not apply to exotic ones, such as reverted rubber and viscous hydroplaning, which can occur at speeds as slow as 5 knots.

• To compute time between two points, round the ground speed to the nearest multiple of 30 and divide by 60. The result is the number of miles per minute you are traveling. The reason for rounding to a multiple of 30 is to give numbers that are easier to digest.

Example: 320 knots rounds to 330 knots. Divided by 60 gives a speed of 5½ miles per minute. If your next reporting point is 110 miles away, you should be there in about 20 minutes.

Continued

• Is your attention span too short to use the familiar "10 times the distance covered in six minutes" gouge to figure DME ground speed? If patience is not one of your virtues, try multiplying 100 times the distance covered in 36 seconds. Granted, it is a "quick and dirty" estimate of your ground speed. However, if your friends consider you to be a "quick and dirty" individual, it might be just the ticket.

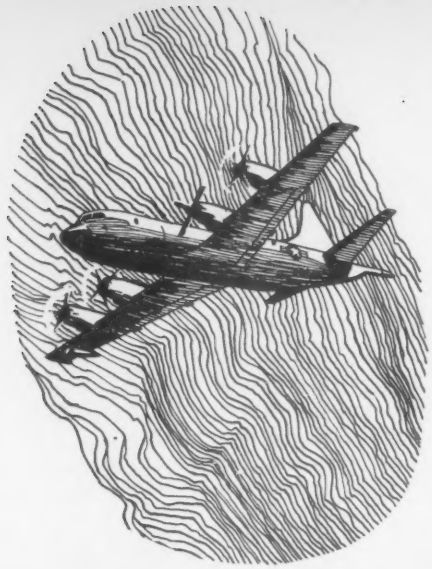
Winds

• For each percentage point of your liftoff speed which the headwind/tailwind represents, your takeoff distance will decrease/increase by twice as many percent. This is only a general rule. In practice, a tailwind affects you more than a headwind. Of course, a rule of thumb is never a substitute for proper takeoff planning. This rule also works for landing distance.
Example: Your computed liftoff speed (V_{lof}) is 120 knots. A 12-knot headwind will decrease your takeoff distance by 20 percent. A 12-knot tailwind will increase the distance by a little more than 20 percent.

• To determine drift angle from a crosswind, or a crab angle to correct for it: angle = 60 ÷ TAS x crosswind. This rule is handy to know if you leave your plastic "whiz wheel" sitting in the sun too long.
Example: 300 KTAS, crosswind component of 30 knots, drift/crab angle = six degrees.
Hint: round your TAS to the nearest multiple of 30 for easy figuring.

• To figure crosswind components: one-half the reported wind @ 30 degrees, two-thirds @ 45 degrees and six-sevenths @ 60 degrees. An easy way to compute six-sevenths is to subtract 15 percent from the reported wind. Remember to use the gust value for crosswinds and tailwinds.
Example: For runway 25, winds reported by the tower as 280/15G25 will have a crosswind component of ½ x 25 = 12.5 knots.
Remember also that surface winds in a sequence report are *true,* whereas those given to you by the tower or approach control are *magnetic* — which is what we're really concerned with. Also, the reported tower winds are usually measured at 50 feet above the surface. Actual runway winds may be less. For this reason, many airlines allow crews to use only one-half of headwind components for computing takeoff performance and they require the addition of one-half the headwind to V_{ref}.

• Winds at 2,000 feet AGL will be double the velocity and are 30-45 degrees clockwise from the surface winds. Most of the change in velocity will occur below 300 feet AGL. The actual ratio of velocities will vary with obstructions and temperature lapse rates (higher ratio with lower-than-standard lapse rate).



Example: Surface winds reported at 250/20. Expect the 2,000-foot winds to be about 290/40.

• A tailwind in flight indicates that a low pressure area is to your left (to your right in the southern hemisphere).
Example: You have a tailwind while heading north. A low pressure area lies to the west.

• Expect mountain waves if a wind greater than 35 knots is blowing within 30 degrees perpendicular to a ridge or line of mountains (use the winds aloft forecast for the altitude nearest to that of the mountain tops). Remember that winds aloft are reported as true, not magnetic.
Example: You are planning to make a flight to Buckley ANG base, in Denver, at the eastern foot of the Rocky Mountains. The DEN winds aloft for 12,000 feet are forecast to be 270 at 50 knots. STAND BY!!!

Altitudes

• To determine ISA: ISA °C = 15 - 2 (altitude ÷ 1,000) or more simply, ISA decreases 2°C per 1,000 feet, from its sea level value of +15°C.
Example: ISA for 6,000 feet MSL =+3°C.

• To determine density altitude, add 1,000 feet for each 15°F (8°C) above ISA.
Example: 3,000 feet pressure altitude, 63°F, density altitude = 4,000 feet.

• To determine true altitude, subtract 4 percent for each 20°F (11°C) below ISA.
(The discussion of true altitude is beyond the scope of this article. However, it is extremely important if you're flying in the mountains in wintertime. It compensates for altimeter errors due to temperature. This is not the same as density altitude, which affects aircraft performance.)
Example: 10,000 feet indicated altitude, @ -16°C, true altitude = 9,600 feet.

• "High to low, look out below." If you fly to an area with lower pressure and/or temperature, your altimeter will read higher than your actual altitude MSL.

• Flying across the "pond" and confused by altimeter settings in millibars?
One inch of mercury equals approximately 34 millibars or 10 millibars equals 0.3 inches.
Example: If the altimeter setting changes by 10 millibars while you're flying, your altitude will be 300 feet off.

• Half of the atmospheric pressure (1013.2 millibars) is below the positive control area (18,000 feet).
Example: 500 mb charts are for approximately 18,000 feet. Others are proportional (e.g., 850 mb are approximately 5,000 feet, 300 mb are approximately 30,000 feet).

Weather

• To estimate the bases of convective-type (cumuliform) clouds during warmer parts of the day: the cloud bases will be 222 feet above the ground for each 1°F of dew point spread. This is based on an unsaturated air lapse rate of 5.4°F per 1,000 feet and a dew point decrease of 1°F per 1,000 feet. The exact gouge number is 227 feet per degree, but it's easier to remember "three deuces."
Example: Temperature 70 degrees, dew point 40 degrees, expect bases at 6,600 feet AGL.

• To quickly estimate the relative humidity, multiply the temperature-dew point spread by 2.5 and subtract the result from 100. The basis for this rule is that a 20°F drop in the dew point represents a 50 percent decrease in the moisture content of the air (specific humidity).
Example: Temperature 70 degrees, dew point 60 degrees, RH = 75 percent.

• If OAT decreases faster than 3°C per 1,000 feet, watch for thunderstorms. A lapse rate greater than the ISA rate of two degrees indicates unstable air.
Example: As you descend to NAS Pensacola, you compute the actual OAT at 15,000 feet to be -20°C and at 5,000 feet to be +20°C. Recommend that you review the next gouge rule.

• Thunderstorms are usually meanest on the side toward which they are moving (as indicated by the 18,000-foot winds) and on the side from which they are feeding, as indicated by the low-level wind flow (usually southerly). The turbulence inside a storm is usually worst near the freezing level. Also the possibility of lightning strikes are greatest at 0°C. Buy a weather guesser a beer to find out why.

• To convert the temperature from Fahrenheit to Celsius with your pocket calculator or fancy calculator

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watch, here's the formula: °F = (°C x 1.8) + 32. To convert °C to °F, use: °C = (°F - 32) ÷ 1.8. If you don't have a calculator handy or you forget the formula, there's hope. We should all know that ISA at sea level is 59° F or 15° C. By remembering that the ratio of change of temperature in Fahrenheit to Celsius is 9-to-5, it is easy to calculate the Fahrenheit equivalent for each increment of 5° C. Thus, 10° C equals 50° F and 20° C equals 68° F. If these calculations represent the limits of your math ability, an easy way to remember the equivalent of 30° C is to transpose the equivalent of 20 degrees (20° C = 68° F, 30° C = 862° F). Of course, if you have a degree in math, you could add 18° F to 68° F and arrive at 86° F. What if the tower has the nerve to put on an ATIS tape which says the temperature is 82 degrees? Do you have to look like a fool and ask your flight engineer or B/N for a "whiz wheel?" 'Course not. Since a change of 1° C is approximately 2° F (actually 1.8° F), pick the nearest easy-to-remember Fahrenheit equivalent (in this case 86° F, which is 30° C) and add or subtract in increments of 2° F. Thus, 82° F is approximately 28° C. Hopefully, you don't need to be a rocket scientist to do that.

Example: 64° F = 18° C.

- If a station is reporting greater than a trace of precipitation, the cloud layer is usually at least 4,000 feet thick.
- In layer-type (stratiform) clouds, icing is rarely found more than 5,000 feet above the freezing level. The area of icing is usually 2,000 to 3,000 feet thick.
- In cumuliform-type clouds, the worst icing is near the tops.

Descent and Position Information

- Slant range error for DME is negligible if the distance is at least one mile for each 1,000 feet above the station.

Example: You're tuned into the Denver VORTAC (elevation 5,225 feet) and flying at FL 230. If you're showing at least 18 DME, the slant range error is negligible.

- To determine your distance from a selected VOR or TACAN radial, each degree of displacement represents 100 feet per nautical mile from the station, or one mile for each 60 miles from the station.

Example: The radial for your assigned airway is 270

degrees. You have deviated (with ATC permission) to avoid a thunderstorm and now find yourself on the 275 radial at 60 DME. You are five miles, or 30,000 feet, from the centerline of the airway. Your HSI or CDI would indicate 2½ dots displacement if each dot equaled two degrees.

Peck's Extras

• To figure the distance to a VOR/TACAN/NDB which is passing abeam: time to station (in minutes) = # seconds for bearing change ÷ # degrees of bearing change. Example: Your TACAN has expired (excuse me for poking fun at the ARN-52) and you're on a vector of 090. As you're passing abeam the Podunk VOR, you notice that it takes 100 seconds to travel from the 355 radial to the 005 radial. You quickly calculate that you are 10 minutes of flying time from Podunk. At your estimated ground speed of 300 knots, you're 50 miles north of the Podunk VOR.

• Your rate of descent while on a standard three-degree glideslope will be five times your ground speed (or half your ground speed, times 10).
Example: If you expect a ground speed of 140 knots, your rate of descent should be about 700 fpm (the actual value is a bit higher — see the table in your FLIP charts). Another use of this rule of thumb would be if you notice that it takes a 500 fpm descent rate to keep the PAR controller singing the "on course, on glideslope" chant. That indicates that your ground speed is about 100 knots. If your TAS is 140 knots, then you have approximately 40 knots of headwind component. No wonder the controller asked if you are a helicopter.

• A standard three-degree glideslope descends about 300 feet per nautical mile or a 1-20 ratio.
Example: You are on a visual approach to a runway whose touchdown zone is 1,000 feet above sea level. You notice from the airport diagram on your approach plate that the TACAN station is located near the departure end of the runway. That means that the distance to the touchdown zone will be about one mile less than what your DME shows. If you're at 11 DME and 5,000 feet MSL, you're about 1,000 feet above a three-degree glideslope. This is not necessarily bad, but you should always know your position in relation to that glideslope in order to have a safe, well-managed descent.

• Using the above 1-20 ratio for a three-degree glideslope, it should be obvious that each foot you are above the ideal glideslope will extend your touchdown 20 feet farther down the runway. This, of course, doesn't apply if you dive for the runway after breaking out at minimums. I don't recommend this unless you like seeing your name in the newspaper and you enjoy sitting at the end of long green tables.

• To remain on a three-degree glideslope to the "touchdown zone," you should be just a bit less than 200 feet above the TDZE (touchdown zone elevation) as you cross over the approach lights. If the source of that information baffles you, stay tuned for a future article on the subject.

• For a localizer or ILS approach, each dot off center on the CDI represents about 200 feet from centerline at the middle marker. (This is based on a localizer width of five degrees. The actual range is 3-6 degrees.) If you're fortunate enough to have a glideslope receiver, each dot off center on that instrument represents about 17 feet at the middle marker.

Putting It Together

Let's put some of these rules to work in typical situations we might encounter.

• After your previously mentioned flight to Denver, you've decided to continue on to Hill AFB, Utah, elevation 4,788 feet. You're on a PAR approach to runway 14, with thunderstorms in the area. You're doing a pretty fair job of holding 140 KIAS as an approach speed. Approach control tells you that the surface winds are 130 at 10 knots. As you pass 6,000 feet, you notice that if you maintain a descent rate of 500 fpm, the controller keeps reporting "on glideslope." The heading it takes to stay on course is about five degrees left of the runway centerline. The gouge rule says that your ground speed is only 100 knots — pretty slow for this rocket ship that you're flying. You use another gouge rule to compute the TAS so that you'll know the wind component up here. At 6,000 feet, your TAS should be 12 percent higher than the IAS. To quickly calculate the 12 percent, you figure that you can use 10 percent of the IAS and then and one-fifth of that number. That means your TAS is 140 + 14 + 3 = 157 knots. That tells you that you have a 50 to 60 knot headwind component with a fairly strong left crosswind. That's quite a bit different from the gouge rule of "45 degrees clockwise and double the velocity" for the 2,000-foot AGL winds. "Something definitely ain't right here." You begin to mentally review the excellent articles on windshear which have appeared in Approach. "Forewarned is forearmed."

• You're inbound to Liberty Boat AFB from the southeast for an RON. You've requested and received clearance for a visual approach to runway 31. The TACAN IAF is the 280 at 22 DME, so a visual is definitely quicker now that the PAR has been decommissioned. The big question now is: "How do I maintain a good three-degree glideslope without a 'ball' or a PAR controller?" Piece of cake, you decide. The TACAN is located near the touchdown zone for runway 31, according to the TACAN approach plate. That makes it easy. You'll just multiply the DME

by 300 feet and add that to the 1,200-foot airport elevation (10 DME = 4,200 feet, 5 DME = 2,700 feet). You now realize that's what the ASR controller is doing when you're given recommended altitudes during an approach. This gouge is not especially useful close in, so you plan to cross the beginning of the approach lights at just a bit less that 200 feet above the TDZE. Result: another "squeaker" in the touchdown zone. What a great "stick" you are! Of course, if that visual approach had been to a downwind pattern, you would have used the pattern altitude for your computations rather than the airport elevation. Your "target" DME would have been a bit short of the airport to allow for decelerating to pattern airspeed.

• You're on a TACAN approach with a series of step-down fixes which you plan to fly at 150 KTAS. You would like to make the flight as smooth and uneventful as possible to impress the Commodore (or perhaps that cute lieutenant from AIMD) who's riding in back, so you want to minimize the number of power changes (hear that, you LSOs out there?). You notice from the approach plate that the FAA wants you to be at 3,300 feet at the 11 DME and 1,800 feet at the six DME. Let's see — 1,500 feet to lose in five miles (sounds darned close to a three-degree glideslope). At 2½ miles per minute, it should take you about two minutes, so you'll need about 750 fpm between those points, assuming no wind. That'll be a lot smoother than diving to 1,800 feet, and adding power to maintain altitude.

It should be noted that the final descent to the MDA should be more rapid (usually 1,000 fpm) if the approach will be to minimums — to avoid an unnecessary missed approach (more on that in a later article).

The Grand Finale

• The three most useless things to a pilot are: altitude above you, runway behind you and fuel that you've burned.

• A good copilot knows three things: "Yes, sir," "No," sir" and "I'll take the ugly one, sir."

• Last, but not least: Keep the pointy end forward, the dirty side down and dangle the dunlops. ◄

Lcdr. Peck is a P-3 plane commander in the reserves and an F-27 captain for Horizon Air, after seven years of active duty flying helicopters and C-1s. In addition to an ATP and five type ratings, he is a certificated flight instructor with single and multi-engine land and instrument ratings. He holds advanced and instrument ground instructor licenses and a commercial certificate for single engine land aircraft and helicopters.

NMACs*, Civilians and You

By Peter Mersky
Approach Staff

WHEN I was a young man fresh out of college, trying to decide what to do with my life (actually I was waiting for the Navy to decide), I went out west to Reno to learn to fly at a civilian flight school in the clear blue skies of the Sierra Nevadas near Pyramid Lake. After I had some time and experience (?) under my belt, I was allowed to plan a lengthy trip to California. I landed at Napa to refuel, and since it was early September, the grapes were in full bloom there, and the fragrance just came right through the cockpit. I swear I nearly got drunk on the approach. It was a uniquely clear, sunny day in the Bay area, and I flew out over the Golden Gate Bridge, then headed toward San Jose. (Yes, I knew the way. The song was popular at that time.)

As I reached what I thought was an appropriate distance from San Jose Airport, I dutifully called in, telling the tower I was 20 minutes out. They acknowledged and asked if I could see the field. In my best pilotese, I replied I had it in sight. I answered honestly, but I was dead wrong! What I though was San Jose was in reality NAS Moffett! I didn't realize my mistake until I found myself with a P-3 at my six. I suddenly felt very insecure in my little Piper Cherokee as I watched the four-engined monster steaming up my back from a wide arc.

I was too scared to yell for help, but thrust my machine into a shallow dive out and away from the traffic pattern at the NAS. I'd stumbled into the approach path at

*Near Midair Collisions

Moffett and had nearly become a statistic. Who knows what the P-3 crew felt or said. Did they even see me? Did the controller advise them of "numerous small targets in the area," of which I was one? Did they call "traffic at 10 o'clock, altitude unknown?" Did the Orion crew say "No joy," or "We've got him in sight?" I'll never know. But it was one chastened student pilot who finally landed at San Jose 20 minutes later. From that time I always flew with my head on a swivel. See and be seen. See and avoid. Catchy phrases, but words which indicate a continuing problem in high density areas. A recent message from a VP squadron plaintively cried, "Corrective action: beyond the capability of this command," while addressing a near midair.

Unfortunately, while the solution to this ongoing problem rests more with all the flight crews involved than perhaps any other in-flight situation, a lot of the burden of instruction rests with the civilian population. As a student naval aviator you had ample opportunity to operate in high density areas, especially around your primary field, and hopefully, you soon learned the advantages of watching out for other folks in the pattern. However, your civilian counterparts, especially those in the quieter rural areas, just don't get the constant training or exposure to traffic. It's like driving; if you don't get out and drive on the freeways on a regular basis, your occasional excursions onto those roads can be disasters in the most literal sense. So the burden of watching out for the other guy most likely rests with the military aviator when operating in a high density area in concert with civilian pilots.

The situation in the training command has not changed, in case you were wondering. In fact, it has probably worsened since your time there. On a recent visit to the Pensacola/Whiting area, I had the opportunity to interview Capt. Jerry Hatcher, Commodore of Training Air Wing 5. Hatcher almost immediately voiced his concern over the continuing and growing problem of congestion in the skies. His concerns are well founded since the squadrons at Whiting fly *10 percent of all Navy and Marine Corps flights and 40 percent of all flights in the training command. They recently flew 60,000 hours in one quarter alone.*

Navy aircraft in the northwestern Florida area compete with aircraft from other military fields, civilian airliners and, of course, general aviation participants from the private sector, not to mention aircraft from the same squadrons. There can be 12 to 15 TH-57s at the same practice area at the same time on an average day. Where does the rest of the flying community fit in? The true story is told of the civilian crop duster who landed his helo in the midst of some very surprised and distressed Navy and Marine chopper trainees. Ignoring the common sense of watching for other aircraft, the duster pilot put his helo down to ask if anyone minded if he dusted the area immediately adjacent to the practice area. When he was told to stay put so that the proper authority could be called to impound his aircraft, he quickly beat a hasty retreat and disappeared over the nearest tree line.

It's interesting to note that many of the near midairs involving civilian and military aircraft include the P-3 and E-2. According to Naval Safety Center records, for the five-year period 1978-1984, P-3s reported over 100 NMACs with civilian aircraft. This is understandable. One, because the turboprops operate in the same general regime as the civilian bugsmashers, especially when close to the airport, and two, because people seem more alert to high performance aircraft operating areas which are specifically marked on civilian sectional charts. The military climb corridors and training areas are clearly shown and since every civilian pilot has some knowledge of how powerful and fast military jets are, he is inclined to give those areas a wider berth than the general area of operation of his home field which is sometimes close to a military base, if not on the same field, although such is not always the case.

Recently, a Navy A-7 and Marine AV-8B were airborne in a restricted area southeast of a major testing facility. The ground controller advised the two military jets that a civilian Cessna had entered the restricted area, and having contacted the controller, its pilot was asking the reason for the proximity of military traffic. When advised that he had violated a restricted area, the civilian responded that he had not been told by Flight Service that the area was "hot." This, coupled with the pilot's admission that he was "not exactly sure" where he was, could have set the stage for a midair. Undoubtedly, the little Cessna would have lost the argument to either one of the jets.

One new area of civilian flight operations is that of the ultralight. These small, fragile contraptions represent a considerable hazard, not only to the operator himself, but to the general population on the ground and in the air. Presently, there is very little regulation governing ultralight operations, although there is considerable discussion underway to rectify this anarchical situation. The pilot of an ultralight does not need to be licensed, medically or instructionally, nor have any formal instruction in the safe operation of his aircraft. Although ultralights have become the "in" form of private flying and are enjoying a great deal of commercial success, it is sad to report that many — though of course not all, perhaps not even a majority — of ultralight pilots frequently disregard or violate established procedures and safety rules, as well as common sense. In their specific operating areas — anywhere an ultralight pilot sets up shop — ultralights represent, arguably, the greatest localized civilian/military flight hazard today.

The P-3C had completed its fourth and last practice mining run and had begun a climbing left hand turn when a cockpit observer saw a white ultralight about 100 feet above and 300 feet away from the big Navy turboprop at the one o'clock position. The P-3 pilot immediately pulled

back on the yoke and climbed above the ultralight which continued to fly its established heading without any evasive action. The civilian pilot probably never knew how close he had come and just sailed along, fat, dumb and happy. Were it not for the alert crewmember in the cockpit and the quick reaction of the PPC, there was a strong possibility of the Orion having the "flying chair" for lunch.

Even under radar control and with constant communication between the aircraft and tower or controlling facility, midairs, or near midairs, continue to pose problems. In the high density area around Moffett Field, two P-3s were alerted by NAS Moffett tower that a civilian Cessna was transiting the area at 2,000 feet, the assigned altitude for such flight activity. The Cessna pilot had rogered the instruction as well as the subsequent call of P-3 traffic, although he did not have the Orions in sight. The Navy aircraft, in turn, were also given traffic information, and fortunately the military crews spotted the Cessna at 1,000 feet, not the 2,000 feet he had been told to assume. The alert Navy crews initiated a power off, descending right dive to separate themselves from the civilian aircraft, whose pilot finally confessed that he was only then approaching 1,600 feet.

An SH-3D was practicing GCAs at a northeast NAS. The controller alerted the helo pilot to traffic on the final approach path. The Navy pilot located the target, a civilian Hughes helicopter, performing maneuvers right on the GCA final. The two helicopters came to within 200 feet separation before the Navy aircraft initiated evasive action. The civilian trespasser turned out to be a student pilot on his first solo cross-country. After seeing the Navy Sikorsky, the civilian called the NAS tower and *then* asked for permission to transit the area. Permission was granted, but only after the civilian pilot had been made aware of his violation of an active military airspace. Again, although the civilian operator was at fault for having wandered into an airport traffic area, the responsibility for avoiding a mishap unfairly rested with the military controllers and, of course, the flight crew.

And in the it-was-bound-to-happen department, a flight of two CH-46Es were transiting the Los Angeles area near the site of the 1984 Olympics when one of the Marine pilots spotted a civilian Cessna 172 approaching them in a climbing left turn, probably intent on observing the games below. The wingman made a call to his lead and broke away in a descending left turn. The flight lead, however, did not hear the call and therefore took no evasive action; neither did the Cessna. Fortunately, although the closest estimated point of approach between the military and civilian aircraft was 150 feet, the planes passed each other without contact. It should also be noted that, although the helicopters were in contact with Santa Monica tower, no advanced warning of the approaching traffic was given.

Shared skies do not, unfortunately, mean shared responsibilities, unfair though that may be. The people on the ground can only do so much in guiding all aircraft, just like policemen can only regulate traffic up to a point, and issue violations after the fact. The burden of coping with congested skies rests solely with the flight crews of all types of aircraft; more so with military folks, if only out of self-preservation. With more time overall and more constant flight experience, the military aviator's responsibilities are clear. ◄

Near Midair at Midnight

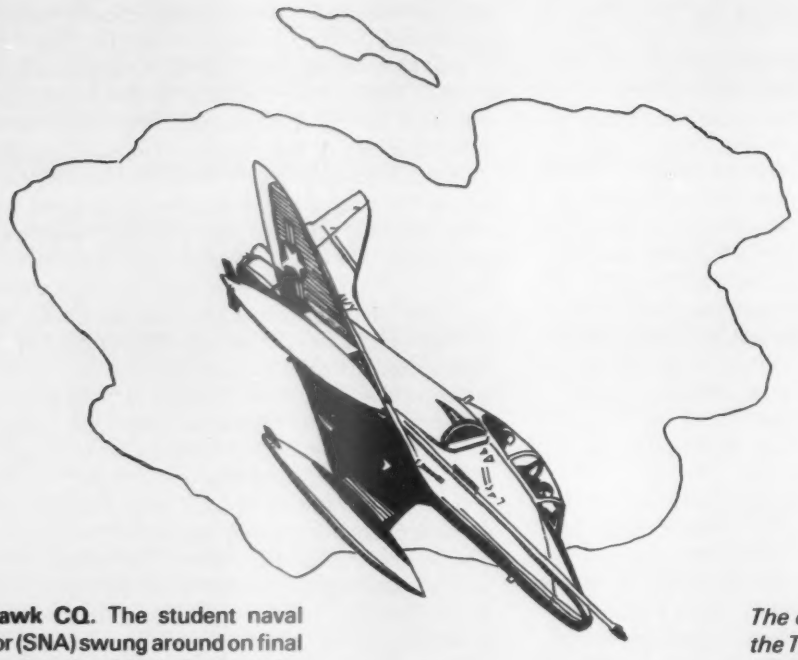
By Lcdr. R.L. Griffith
VP-4

IT was a moonless night, in mid-ocean. Upon check-in, our air controller said, "Fly heading 070 to mark on top my station. *I assume your safety of flight.*" The controller then proceeded to rattle off our tasking as we headed toward the mark on top.

In the distance we could see the light of an aircraft which was at our 12 o'clock position, with right to left bearing drift. Since his red wing tip light was indistinguishable from his rotating beacon, I assumed he was not close. The aircraft disappeared from sight behind the pilot's forward windshield. The controller continued with his tasking, "Mark on top my station, then proceed northwest. Search an area from 300 to 360 from my station, 15 to 20 miles. You should see my station at your 12 o'clock, seven miles."

We did see his ship at our 12 o'clock. We also saw a green wingtip light at 10 o'clock. The other aircraft had turned toward us! Realizing that we were on a collision course with the other aircraft, I made a split-second analysis of the chances for success of maneuvers available to me. If we turned right, he would run into us from behind. If we turned left, we'd run into him head-on. If I dove the aircraft, I thought I might still hit him. If we climbed, we would likely clear him. I clicked off the autopilot and pulled up, hard. The aircraft passed under ours with a clearance of a few feet. We notified our controller that there was another aircraft out here. The controller reported that his altitude readout indicated the same as ours. No kidding!

I met the pilot of the other aircraft after the flight. He had been in a port turn, under control of a different ship, and never saw us. He had been advised by his controller that there was no other traffic. Our controller similarly had not advised us of the traffic, but he had "assumed our safety of flight!" Lucky for me that I followed the advice of the old test pilot who had 10,000 flight hours. He said, "Keep your head out of the cockpit. Then you'll see the other aircraft that almost runs you down." Good advice, old timer. ◄



Skyhawk CQ. The student naval aviator (SNA) swung around on final approach to the ship during a carrier qualification hop. He completed two uneventful touch and go's and was cleared for a trap. The LSO, however, initiated a foul deck waveoff. Responding to the LSO's waveoff, the SNA selected military power, speed brakes in and maintained optimum AOA. The engine rpm continued to decay, and the student had some quick decisions to make. Quickly analyzing the situation, he concluded he had enough airspeed to come aboard and thus chose to stay with the aircraft.

The Skyhawk touched down past the arresting gear with approximately 100 feet remaining. As the aircraft approached the end of the angle deck, the SNA was preparing to eject when he felt and heard the engine thrust begin to increase. (The LSO also heard the power increase.) The TA-4 left the angle with a relatively low sink rate, but began to climb approximately 100 yards off the deck. The SNA established a good climb and was given a vector to the beach.

Arriving over the field and establishing a descent, he felt the rpm begin to decay but made a safe recovery. Tests of the faulty engine disclosed a repeatable 3 percent decay or hangup below 80 percent which was traced to the fuel control assembly. The student's commanding officer commented:

"J-52 fuel controls have not been on an overhaul cycle since 1978. During engine overhaul, current policy is to flow check fuel controls and RFI passing units. In the past year, the squadron experienced 10 fuel control/engine anomalies . . . there is every possibility that this specific problem will return to bite the A-4 community . . . it is most strongly recommended that J-52 fuel controls be put back on an overhaul cycle."

The decision has been made to put the TA-4J's J-52 P-6 fuel control on a 2,000-hour overhaul schedule by mid-October 1984, by which time the engine change proposal (ECP) will be made. This ECP will incorporate redesigned pin, roller and spring for the fuel control assembly. — Ed.

Orion Alert. Many people stop to watch aircraft flying by. How many really take a close look at what they are watching? A VP-30 crew is thankful that Ltjg. Gary Wolfe of VP-5 took a close look at its P-3. Wolfe, while observing flight operations from the ground, noticed the VP-30 aircraft making its approach to NAS Jacksonville with the nose gear cocked 45 degrees to the right. The Orion was on a post-maintenance check flight, and after getting an unsafe nose gear up indication, the pilot lowered the landing gear and obtained a three-down-and-locked indication. The crew, suspecting only a failed uplock switch, prepared for

AIR BREAKS

a normal full stop landing.

However, Wolfe's sharp eye saw the cocked nose gear, and realizing the severity of the situation, he quickly notified the tower, which in turn, called the P-3 now on final. The P-3 executed an immediate waveoff. Wolfe made his way to the tower and assisted the controllers while the P-3 executed fly-bys for visual inspection of the cocked nose gear. A coordinated landing followed, with the left seat pilot, Lt. Greg Hogue, forcibly holding nose wheel steering to stabilize the displaced nose gear in the centered position while Lcdr. Randy Waldrip, in the right seat, landed the aircraft and brought it to a stop.

As Capt. B.E. Tobin, Jr., Commander, Patrol Wing 11, commented, "The true success of any safety program cannot be measured solely by a battery of 'mishap free' statistics. Rather, the active involvement of naval aviation 'professionals' identifying and elimination hazards before they turn into mishaps is the ultimate goal of the naval aviation safety program. Wolfe's 'take charge' leadership during this incident exemplifies how successful our teamwork can be in mishap prevention . . ."

Seaknight Aft Station/Security Checks. After conduction night Vertreps with a CVN, the HH-46 recovered aboard the carrier to refuel. Prior to takeoff, several unsuccessful attempts were made to reset a popped utility return filter found during an aft station/security check. The HAC elected to return to the staged AFS deck, 500 yards abeam, where det maintenance personnel could investigate the problem. Turning on final, the HAC experienced erratic control inputs in the cyclic. He made a precautionary landing and prepared to shut down. As the ship maneuvered to place the disengaged winds within limits, the HAC selected control boost 1. The utility hydraulic hot light illuminated. NATOPS emergency procedures for the hot light were made, including auxiliary power plant (APP) shutdown and control boost 1 was reselected. After five minutes, the wind limit was achieved and a no APP shutdown executed.

Post flight inspection of the return filter revealed a large amount of metal fragments in the filter element and a disintegrated utility hydraulic pump. The APP motor was also beyond repair.

The commanding officer's comments vividly point out the importance of *timely* aft station/security checks. He said, in part, "Aft station checks, including inspection of the hydraulic filter differential pressure indicators, should be performed at least every 20 minutes. However, they can easily be stretched out during high tempo Vertrep ops . . ."

The bottom line is make the aft station/security checks — and make them often! — Ed.

Tomcat Flaps Flap. Returning from a routine CAP mission, the F-14A entered the CV Case I landing pattern. Arriving wings level, downwind at 200 KIAS, 800 feet, the pilot lowered the flap handle. Immediately, the Tomcat commenced an uncommanded roll to the left. In compliance with NATOPS, the pilot repositioned the flap handle, countering the roll-off with lateral stick and rudder, selecting military power and commencing a climb. The RIO notified the ship as to the nature of the problem. A visual inspection revealed that both slats were full down and both aux flaps were full up. The port main flaps were three-quarters down and the starboard main flaps were split (the outboard section was full up and the inboard section was partially down).

A controllability check was made and it was determined that minimum controllable airspeed was 150 KIAS. A visual straight-in approach was commenced with 3,000 pounds of fuel on board but was waved off due to insufficient wind over the deck. The F-14 was vectored to an orbiting tanker. After several attempts to connect with the basket, the pilot ascertained that the aircraft, requiring full left stick and half available rudder to maintain level flight, was not controllable enough to permit tanking.

With 2,000 pounds remaining, the aircraft was vectored for another approach to the ship. In a further attempt to reduce the gross weight and approach speed, thereby improving lateral control, the external stores were jettisoned. With 1,700 pounds left, the pilot flew a straight-in approach to an OK 3.

Post flight inspection revealed that a failure of the No. 3 flap actuator had created the assymetric flap condition.

It's been said before, again and again, but still bears repeating. Being prepared and following NATOPS is the best defense. — Ed. ◄

Errata. The second photograph on the Bravo Zulu page in the October 1984 issue was reversed. Maybe the gremlin which hung the RF-4B's gear still had a few tricks left. An additional error crept in the cover photo credit. The fine SH-2F shot was taken by PH3 Roger S. Fazer, Atlantic Fleet Audiovisual Command.

Turboprop Flare Aerodynamics

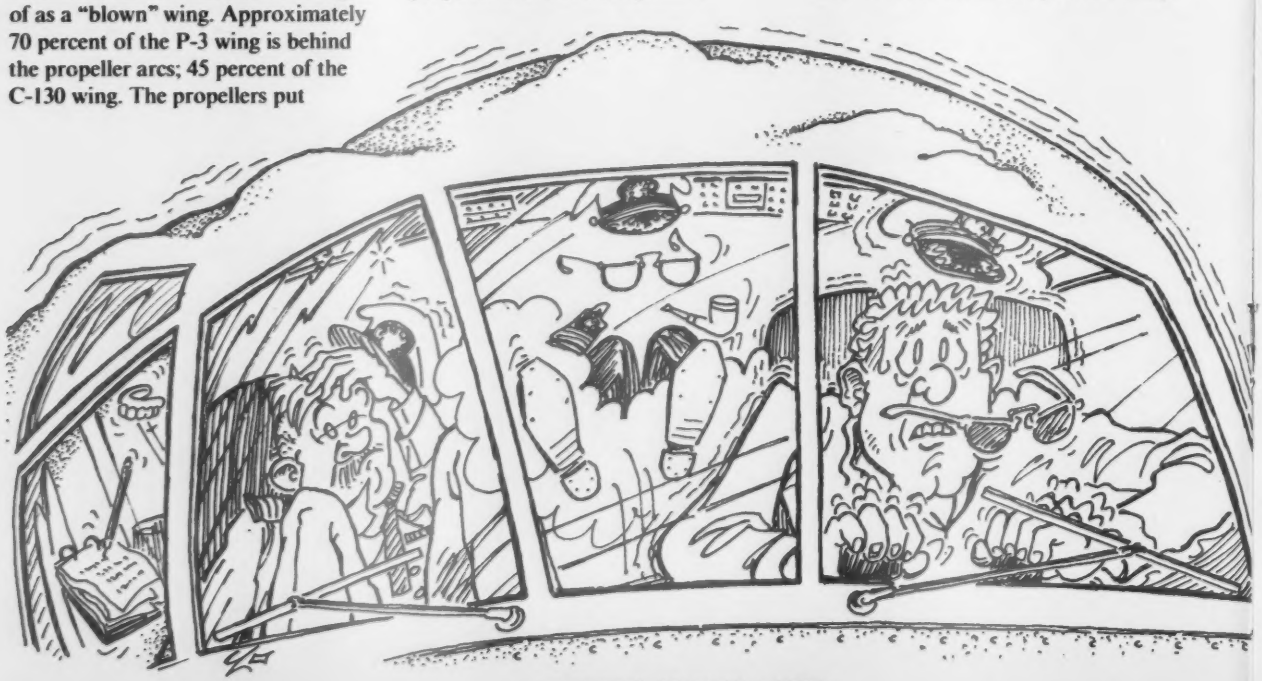
By Lcdr. J.J. Miller
VXE-6

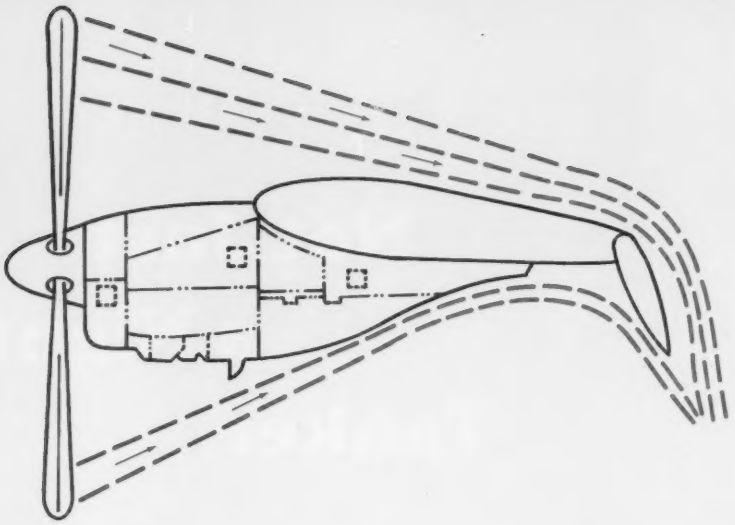
JUST when you think "I'll never make another hard landing again," your turn comes up for the next one. You do everything you did the last landing, but something strange happens and the bottom falls out. You run out of airspeed, altitude and ideas all at once. The last five feet of flight come to an abrupt end. After rollout your copilot announces over the PA system: "Survivors are released, damage control report." What went wrong? You were sure it would be just like the last smooth, controlled touchdown. Why is this plane so hard to consistently land with precision?

There is a reason turboprop planes (P-3, C-130, E-2, C-2, etc.) are more difficult to land smoothly than many other planes. By nature of the power plant installation, a portion of the wing is behind the propeller arc. This location leads to what can be thought of as a "blown" wing. Approximately 70 percent of the P-3 wing is behind the propeller arcs; 45 percent of the C-130 wing. The propellers put energy (dynamic pressure) into the airstream as they produce thrust. Also, the propeller tips introduce a vortex which flows into the boundary layer adjacent to the wing. These two phenomena, unique to turboprop installations, tend to keep the boundary layer attached to the wing and increase gross lift as a function of the thrust produced.

This situation exists through the entire flight range, except the landing phase. Unfortunately, somewhere between 300 SHP/1300 in-lb to 100 SHP/500 in-lb, depending upon the approach airspeed, the propeller no longer produces thrust and actually extracts energy from the airstream to stay on speed. Even though positive thrust is indicated on cockpit gauges, the propeller is generating a degree of drag at low power settings and low airspeeds. The airflow behind the propeller arcs has less dynamic pressure than the freestream, and the propeller vortices diminish rapidly since the propeller blades are no longer producing lift/thrust. The result is a relatively rapid loss of direct wing lift and boundary layer separation moves quickly across the wing. These two phenomena occur not as a function of IAS and angle of attack as in most planes, but a function of SHP/torque.

Inside the plane we use scan to control the descent and deceleration rate. We look at AOA, VSI, airspeed and power settings. As we approach the touchdown point, we primarily use outside visual cues to control our letdown. All of the variables are slowly changing, predictably controlled by pilot inputs at the throttles and the elevator. No problems so far. But about this time we make a further power reduction, and we cross the magic power setting

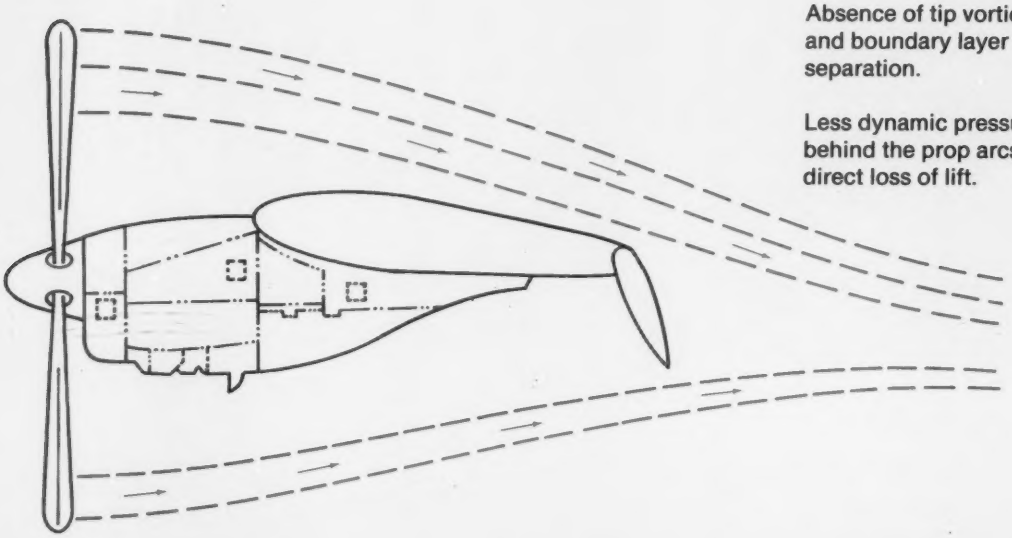




SHP/Torque Greater Than 300 SHP/1300 in-lb

Propeller tip generated vortices assist in holding the boundary layer adjacent to the wing.

Increased dynamic pressure behind the prop arcs produces additional lift.



SHP/Torque Less Than 300 SHP/1300 in-lb

Absence of tip vortices and boundary layer separation.

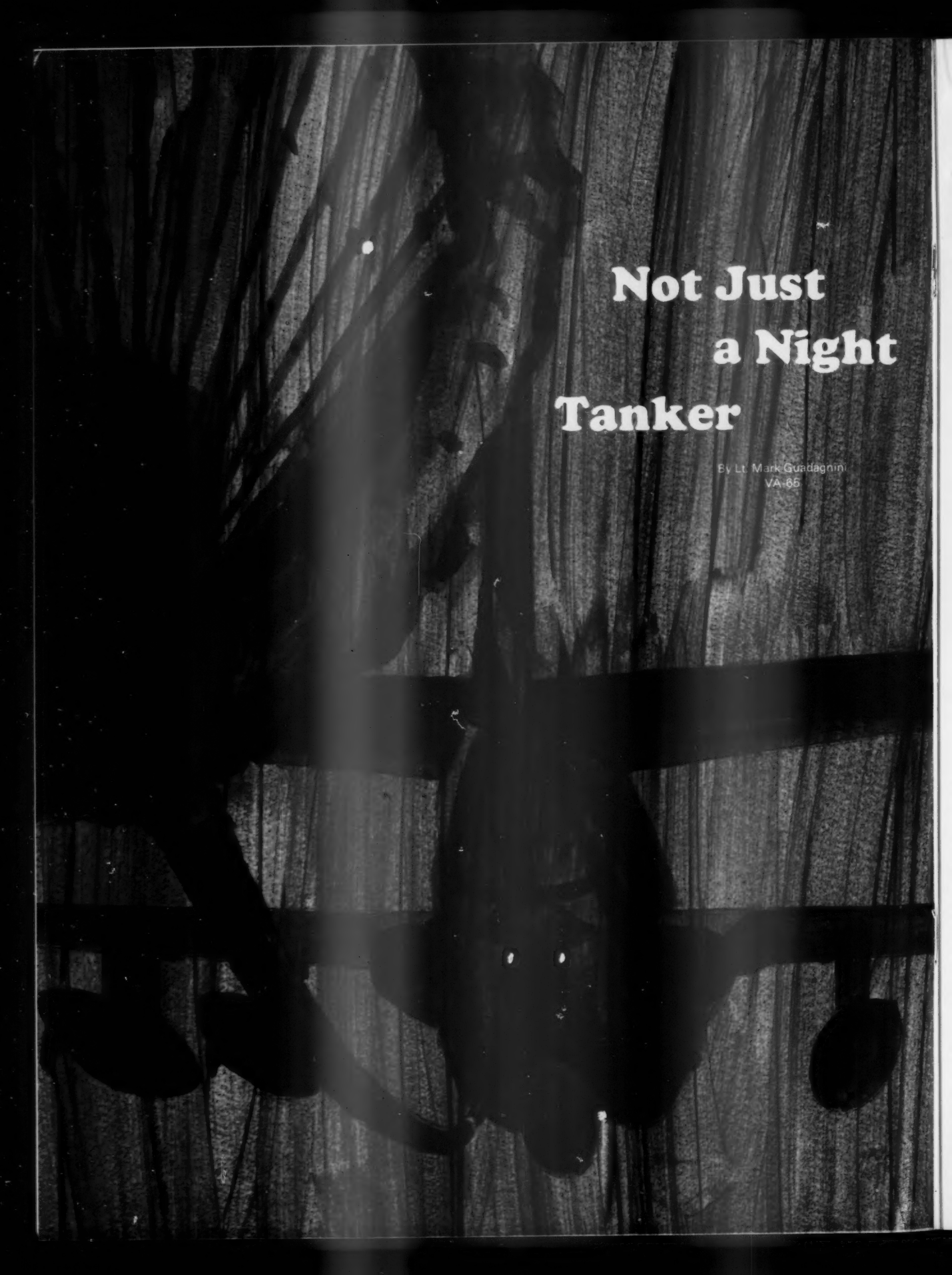
Less dynamic pressure behind the prop arcs and direct loss of lift.

somewhere between 300 SHP/1300 in-lb and 100 SHP/500 in-lb. We get an immediate, non-linear, difficult-to-predict loss of lift which makes the last few feet of flight a freefall.

Every good pilot knows that a great landing is one with a nose-high attitude in the first third of the runway with power at or near zero. The difficulty arises when we attempt to make soft touchdowns. To avoid the boundary layer/loss of lift phenomena, pilots inadvertently land fast at mid-field with excessive power, not a proper landing but a soft touchdown. It keeps the crewmembers in the back, happy and quiet. But when we change destination to a short runway, this technique is no longer acceptable.

To make a proper landing and overcome the boundary layer/loss of lift phenomena, we should learn to evaluate the flare variables and make a non-linear, increasing pitch flare. The flare must occur with the AOA increasing more rapidly as the power decreases through approximately 300 SHP/1300 in-lb. Increasing AOA can compensate for the relatively abrupt loss of power generated lift. By no means am I advocating an automatic elevator pull up as power is reduced through 300 SHP/1300 in-lb. The increased rate of elevator back pressure should occur as the loss of lift is perceived through outside scan. External visual cues are critical during the final stages of the landing.

We must understand that the boundary layer separation/loss of lift phenomena is waiting to reach up and grab us. Only then can we effectively deal with it when it happens. With that bit of knowledge and through practice, we can finally say, "Now I've got it wired." ◄



Not Just a Night Tanker

By Lt. Mark Guadagnini
VA-65

THE weather is 5,000 broken and visibility less than optimum due to haze. There is no moon and it is *dark*. A typical night in the Mediterranean. The night tanker pilot has been flying in a left turn for an hour and a half prior to being sent to low station to "hawk" the recovery. At 3,000 feet now, with no horizon, he tightly orbits the ship in a left turn watching his air wing buddies trap aboard. He positions himself to rendezvous with low state aircraft, all the while looking outside the cockpit to make sure he is in just the right spot. But everyone traps safely aboard, so the tanker is 4,000 pounds heavy as he is descending and being vectored to the final bearing. At three miles and in the approach configuration, he is still dumping fuel. At a mile and a half, slightly below glidepath, he reaches over to secure the dumps. The controller tells him he is going well below glidepath and drifting left. At the ball call he is still low and left. The pilot has been there before, and he knows he can get aboard. He adds power to get the ball up, then tries to get on lineup, but his inner ear keeps telling him that he is in a right turn when in reality the wings are level. As he continues to drift left, the LSO calls "right for lineup." The call just doesn't jibe with what the pilot perceives, so the correction is not enough and the drift continues. Inside the waveoff point, the left wing drops, the hook catches a 2 wire, but the A-6 wing tip catches the radome of an F-14 parked near the port foul line . . .

This article is being written to warn LSOs and tanker pilots about potential hazards of night tanker flying and to prevent an incident like the one described above. As an A-6 squadron LSO and a night tanker pilot, I can discuss both.

Even when the weather is great, a night tanker mission is extremely demanding. The pilot is required to fly the aircraft smoothly and at precise altitudes while watching the progress of other aircraft as they rendezvous, refuel behind him and depart the tanker formation. In addition to the safe operation and flight clearance of his own plane, he is responsible for the aircraft in formation with him, often as many as six aircraft.

The workings of the inner ear and its effect on flight performance are well documented and is an important physiological factor in a night tanker hop. Other factors contributing to degraded pilot performance are stress and fatigue. The fatigue is caused by extreme concentration on the tanker mission and the stress induced by any night carrier-based flight.

Throughout the instrument phase in the training command, a pilot is taught to operate his aircraft smoothly and to rely on instruments for spatial orientation. In the night tanker, especially when hawking the recovery, the aircraft must be flown aggressively and at angles of bank and airspeeds exceeding the 30-degree angle of bank and 250 knots that are the limits for safe instrument flying taught in flight school. Additionally, the pilot's scan is primarily outside the cockpit, focusing on the carrier (a point light source) for orientation and on other aircraft. This "VFR" night scan and semi-acrobatic flight are two more factors contributing to the difficulty of the night tanker mission.

Even after the tanker completes his mission, there are more hardships to contend with. The air traffic controllers attempt to get him aboard as quickly as possible, often giving more rapid descents and shorter hook-ins than normal. The ship may actually start the turn out of the wind (although remaining within safe carrier landing limits) making it harder to get set up on centerline. The problem of saving gas and then trying to get to maximum landing weight during the rushed approach adds another degree of difficulty. Also, the KA-6D instrumentation is slightly different than that in the A-6E, especially the information presented on the visual display indicator (VDI), a situation that will become aggravated with the introduction of the new attitude direction indicator (ADI).

It should be apparent that flying a night tanker is not an easy task. Squadrons, therefore, must closely monitor the aviation abilities of the pilots chosen to perform the mission. The aircrew must recognize the hazards involved with night tanking and be thoroughly prepared and briefed.

The LSOs must also realize that a tanker pilot's landing performance is affected adversely by the mission. Through a study of the landing performance of 22 pilots in an A-6 squadron over a two-year period (two sets of workups and two Med cruises), this adverse effect became evident. Night tankers were flown only by third, second and a select few first-tour pilots (with at least a cruise and set of workups under their belts). In 370 night KA-6D traps, they had a 3.29 landing average and a 95.5 percent boarding rate. Those same pilots in 640 night A-6E traps had a 3.46 landing average and a 95 percent boarding rate. These statistics indicate that night tanker drivers have more difficulty landing, perhaps because of a little bit of "get-aboard-itis."

The tanker comes aboard at a tough time for the LSO, also, after a long day on the platform and always late in the recovery (if not last). If the recovery has been rather normal, paddles can be lulled into a state of complacency, thinking that the tanker will get aboard just like everyone else.

A professional LSO can pick up clues to a possibly hazardous situation by listening to the approach frequency. He can tell if the tanker is getting a rushed hook-in and he may be able to detect anxiety in the tanker's voice transmissions if they are being severely pressed. An early or consistent tendency to drift left is indicative of pilot vertigo. A settle on the ball call or an extended time below optimum glide slope should be a signal to the LSO that the pilot's scan is breaking down or that he is seeing what he wants to see and not responding to reality. Jumping into the cockpit early may very well be what it takes to avert a mishap. In any case, the LSO must be on top of the situation and ready to act.

Everyone from the carrier CO to the tanker pilot should be alert to the difficulty of the night tanker mission. Extra care in handling and awareness on the part of all concerned will help ensure that the mission is completed successfully and that the tanker gets back aboard safely. ◄

Illegal Parking

By Maj. Joseph H. Schmid, USMC
Naval Postgraduate School

Conditions for dynamic rollover are present for nearly every helicopter takeoff. Above is a "worst case" situation.

WHEN I talk about illegal parking, I'm not talking about taking the prime spot in front of the "O" Club or leaving your car along the blue curb. I'm talking about the "other" way of parking a helicopter — wheels on top, rotor on the bottom. One of the most insidious ways of doing this is called dynamic rollover.

Rollover angles. Before I describe what dynamic rollover is, let's see what it is not. There exists for every object a *static rollover angle*. This is the angle to which you must tilt an object to bring the center of gravity directly over the roll point. If the object is tilted beyond this angle, it will fall over. It is this angle that the drunk defies. For most fleet helicopters, the static rollover angle is between 30 to 35 degrees. Every helicopter also has a *critical rollover angle*. This is the maximum hillside angle that you can land the helicopter and still be able to have the rotor system horizontal. Another way of thinking about the critical rollover angle is that it is the maximum blade flapping angle. For most fleet helicopters, the critical rollover angle is on the order of 13 to 17 degrees. The important thing is that you can be committed to dynamic rollover at a roll angle much less than the static or critical rollover angles!

Conditions. Four general conditions must exist for a pilot to get into dynamic rollover:

- The helicopter must be on or restrained to the deck. A wheel or skid could be in contact with the ground or an object on the ground such as a VERTREP load. It may be a tiedown chain that restrains the helicopter even though the skids or wheels are off the ground. In a recent mishap, dynamic rollover was suggested even though the witnesses stated that the wheel was either on the ground or *close to it*. If the wheel was not on the ground, it could not have been dynamic rollover.

- The helicopter must pivot about the ground contact point instead of the center of gravity. There are many common flight regimes in which the helicopter will pivot about the ground contact point. During vertical takeoffs from hillsides, the helicopter pivots about the uphill skid or wheel until the gear are level. Skid kids often shake the rudder pedals before takeoff in arctic conditions to prevent the possibility of pivoting about one skid frozen to the deck. Lateral cyclic during takeoff has been the cause of numerous dynamic rollovers (or pivots about the ground contact point), not only in the training command but in the fleet as well. Taking off with tiedowns attached provides a pivot at the ground attachment point. The Coast Guard uses a quadrilateral grid on its small boys to provide immediate chocking of a helicopter. However, the grid can also provide a pivot point if the pilot lands with a drift. By far, the most common occurrence is ground contact in lateral translation. (Perhaps a classic case is the instructor who was demonstrating a night hover with the position lights on flashing dim. He developed just a bit of a drift. The aircraft caught a skid 650 feet from the initial hover point. The helicopter then flipped smartly onto its back.)

Dynamic rollover can cause a helicopter to flip over on its back. The basic cause of dynamic rollover is excessive angular momentum — something every chopper pilot must avoid.

- The helicopter must have some angular velocity about the pivot point. That is to say, you must have some roll rate about the pivot point.
- The helicopter is usually at liftoff thrust or light on the skids.

Cause. Now that we know when dynamic rollover occurs, let's see why it occurs. The basic cause of dynamic rollover is EXCESSIVE ANGULAR MOMENTUM. Good ol' Issac Newton said that an unbalanced force equals the time rate of change of momentum, $F = \Delta/\Delta t\ (mv)$, or in more common terms: $F = ma$. That is true for objects moving in straight lines. However, for rotational motion, Newton's law changes slightly — an unbalanced *moment* equals the time rate of change of *angular* momentum. $M = \Delta/\Delta t\ (I\omega)$. Angular momentum is defined as the moment of inertia (I) multiplied by the angular velocity (ω). Newton's law really does make sense in relation to our helo. In a hover, we have no roll rate or angular velocity. However, when we displace the cyclic, we tilt the rotor system. The thrust of the rotor system then creates a moment about the center of gravity and the helo develops a roll.

What about this moment of inertia, you say? The moment of inertia is a body's resistance to rotation and is defined for rolls about the center of gravity as the sum of all the bits of mass of the body (m) multiplied by the square of the radius

Wheels are on top, the rotor is on the bottom and often smashed to bits. Under such circumstances, fire is also a threat.

of each of those bits of mass from the center of rotation. Algebraically, the moment of inertia is: $I = \Sigma mr^2$. This is the old spinning figure skater trick. When the skater is on the ice, there is little friction, so there is little change in the angular momentum ($I\omega$) of the skater. As she brings her arms in, the mass doesn't change, but the radius of where that mass is located does decrease. Therefore, as the skater's moment of inertia and resistance to rotation decreases, her spin rate or angular velocity increases.

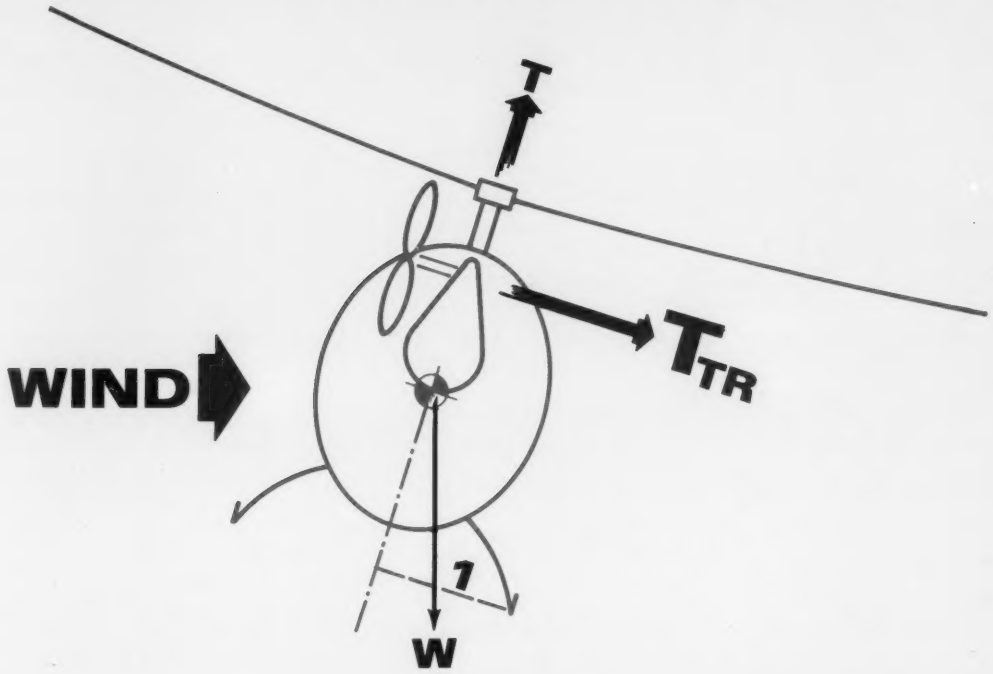
For every helicopter, the manufacturer must determine the maximum control moment. Each helicopter must, by MILSPEC and FARs, achieve a particular roll rate. The manufacturer knows the mass of the helicopter and how that mass is distributed. Hence, he knows the moment of inertia. The manufacturer produces the helicopter so that with full cyclic displacement, the rotor system produces a sufficient moment about the center of gravity to change the angular momentum of the helicopter and achieve the desired roll rate. $M = \Delta/\Delta t\ (I\omega)$.

This is fine and dandy for rolls about the center of gravity, but dynamic rollover occurs when we roll about a pivot point. For rolls about some point other than the center of gravity, the moment of inertia changes to become $I = m \times r^2 + m \times d^2$, where d is the distance between the center of gravity and the point. Clearly, the moment of inertia must be greater for rolls not about the CG. The helicopter still has the same maximum control moment. Therefore, with a greater moment of inertia, full stick displacement will not produce as large a roll rate. More importantly, the helicopter cannot arrest as large a roll rate. That is the insidious part of dynamic rollover. What is a normal roll rate about the center of gravity may well be an excessive roll rate when pivoting about a wheel or skid. The bottom line remains: The basic cause of dynamic rollover is EXCESSIVE ANGULAR MOMENTUM.

There are several contributing factors that can make conditions worse. Any shift of the center of gravity toward the roll point makes the helicopter more likely to statically roll over. This CG shift could be caused by a cargo shift or by personnel changing positions in the aircraft. For American-

Conditions for dynamic rollover must be recognized, understood and avoided to prevent an upside-down impact, as shown above. The key to prevention is to control the roll rate. The roll rate will not become excessive and dangerous if you lower the collective.

$$M = T \times 1 + T_{TR} \times 1_2 + WIND - W \times 1_3$$



made helicopters (apologies to Aerospatiale), the thrust of the tail rotor is directed toward the right. For rollovers to the right, the tail rotor thrust would be an aggravating condition. Winds can also make conditions worse. If the winds are strong enough, the side force on the fuselage may be sufficient to roll the helicopter. Winds from the left will increase the tail rotor angle of attack, increasing the tail rotor thrust. Finally, winds in the direction of the rollover will cause "blowback" of the main rotor, tilting it in the direction of roll.

Prevention. The conditions for occurrence are present for nearly every helicopter takeoff. How, then, do we recognize and prevent dynamic rollover? Earlier we saw that for rolls not about the CG, the moment of inertia increased. In other words, the helicopter is "hoggier." It becomes insensitive to cyclic control. If the conditions for occurrence are present and the helicopter does not respond to cyclic inputs, there is a great possibility that dynamic rollover is imminent. What should you do now? LOWER THE COLLECTIVE!

Let's look at all the forces acting on the helicopter and see how they contribute to the rollover (figure 1). The thrust of the main rotor multiplied by its moment arm about the pivot point is in the pro-rollover direction. The thrust of the tail rotor multiplied by its moment arm is also pro-rollover. The combined effects of the wind are also pro-rollover. Only the weight of the aircraft multiplied by its moment arm opposes the rollover. Algebraically, this is expressed as:

$$M = T \times 1 + T_{tr} \times 1_2 + \text{wind} - W \times 1_3.$$

Countering the roll with cyclic only reduces the main rotor thrust moment arm, 1. Lowering the collective reduces the magnitude of the main rotor thrust. Clearly we have far greater control authority with collective than with cyclic. LOWER THE COLLECTIVE. The gent who tries to snatch the helicopter off the deck with the collective in the armpit may get the helicopter airborne. But he has just made a tremendous increase to the pro-rollover moments and, at an altitude of about three feet, will probably have the rotor blades strike the ground. LOWER THE COLLECTIVE. Collective reduction must be immediate but not a panic reduction. The gent who is ham-fisted and slams the collective down runs the risk of blade-to-fuselage contact or a rollover in the opposite direction, either of which can ruin your whole day.

Bottom line. Prevention of dynamic rollover is simple. CONTROL THE ROLL RATE. You can prevent the roll rates from becoming excessive by judicious use of collective. CONTROL THE ROLL RATE. And if control seems marginal, LOWER THE COLLECTIVE. ◄

Rudder Strikes Metalsmith

IT was the Friday afternoon before a holiday weekend, and a P-3 was in work to have its aft radome pressure bulkhead seal repaired. The work was progressing smoothly. In order to obtain adequate clearance for seal installation, it was necessary to remove the radome boom track stops to slide the aft radome slightly. After the seal had been installed, and as the radome boom track stops were being replaced, the rudder suddenly moved from full left toward the center (neutral) position, striking the metalsmith on the neck. It nearly knocked him from the high lift to the deck several feet below!

Permission to perform a daily inspection concurrent with work in process on the radome had been granted on a not-to-interfere basis by Maintenance Control. The metalsmith had asked the daily inspector to hold off on his inspection until the radome was secured to the track, i.e., radome fully on track and ahead of stops. Once the radome was on the track, the daily inspector proceeded to the flight station IAW MRC No. 2 of his daily deck. Upon energizing hydraulic pump No. 1A, the full left rudder did not agree with the full right aileron and subsequently the rudder snapped toward center due to the flight control interconnect linkages. Presto, one injured metalsmith.

To add insult to injury, the metalsmiths who were detailed to finish the radome installation had to remove the radome once again to align the MAD compensator rod. As they rolled the radome rearward, it came off the tracks and crashed onto the high lift side rail sustaining superficial damage to the radome fiberglass structure. The radome was subsequently repaired and installed without further incident.

Mettlemouse

Pensacola Proliferation

NAS Whiting Field and the surrounding training areas have undergone numerous course rule changes over the last five or six months. Many are unavoidable consequences of progress. However, changes are occurring so rapidly that the instructors can't keep up with them, not to mention the students. There is a lot of confusion among the instructors, especially between different squadrons, to what is the correct policy. Some of the changes seem to come by word-of-mouth instead of through more official channels.

In January, the home field entry procedures were changed at NAS Fixed-Wing Training Field, South East. We went from a good system which had worked for several years to a system which seemed to be instituted just for its own sake. The reason given was to better facilitate traffic flow and avoid the next midair collision. The new rules can put you right in the entry channel of the home field's easterly approach.

It seems to us we do have a real hazard which needs to be investigated, and we need to make any changes resulting from such an investigation noted in a more official manner — in writing — so everyone will know what the real change is.

Headsupmouse and his cousin, Whatsnewmouse

This particular Anymouse was sent to both Approach and the TAW-5 Safety Office. — Ed.

Commander John Spahr, Training Air Wing Five's safety officer, was given the opportunity to reply:

Dear Headsupmouse and Whatsnewmouse,

No contest. Over 25 years of tradition can easily conceal a dangerous home field entry. Several fatal midair collisions and a drastic increase in reported near midairs brought about the formation of a collision avoidance committee from wing and squadron personnel.

One significant change resulted from this committee which took effect in January 1984. Unfortunately, it was only in place a short time when necessity

ANYMOUSE

dictated several changes which more often than not required immediate action.

The pilots did not have a complete set of current procedures because word-of-mouth changes at ops meetings simply did not get passed to the pilots. Now a comprehensive ops manual has just been issued. This manual should provide a zero base for all new operating procedures. Greater administrative discipline has also been built into the mechanics of procedural changes. Following initial committee action, a distinctly structured home field arrival has been produced and has significantly reduced potential for midair collisions during field entries.

Specifically, you were correct regarding the OLF Brewton departure and its possible interference with home field entries. As a result of this and suggestions by other instructors, pattern departures at OLF Brewton changed to permit much earlier turnouts, thus avoiding the entry corridor. Keep your suggestions coming.

Listeningmouse

Sandwiched Safety Standdown

The skipper cast a jaundiced eye at the weather. "ASO, we can't fly today — let's have that safety standdown the powers that be ordered."

"Gee, skipper, we can't hold those things without preparation — you gotta plan the presentations and all."

"OK — make it tomorrow instead."

The big day dawned. The safety petty officers spent the previous evening reviewing their notes and were ready. One small problem — the weather lifted a bit and they were now marginally VFR. Ops decided to sound "boots and saddles" prior to commencing the standdown. Since the launch couldn't go until 1115, it was decided to sandwich the standdown between the launch and the scheduled 1500 recovery. (Don't forget the hour—long chow break for the blood sugar thrown into that period.)

Final Statistics:

Length of standdown: 2½ hours (lunch and head calls don't count). Most presentations were three-minute "be careful of . . ." spiels.

Number of enlisted wrench-turners attending: 50

Number of administrative types attending: 0

Number of pilots attending: 0

Length of flight: 4 hours

Mission of flight: Accrue hours toward flight program

Pilot of aircraft: ASO

Slightedmouse

Hot Dog Huey

At least six naval aviators (total experience almost 5,000 hours) observed the ship's Huey do a pop-up manuever as it crossed the bow from the starboard side to a wingover *in excess* of 60-degrees AOB (NATOPS limitation?). The Huey entered a nose-low attitude as it turned downwind and scooped (a descriptive term) it out at the bottom (i.e., 25-30 feet AGL). The Huey then popped up (30-45-degrees pitch) and came to almost a hover before pedal turning to the left to set up for an uneventful landing. None of the six designated naval aviators and two LSEs thought the Huey was going to recover at the bottom. They all expected a big splash. This wasn't a very good example for these officers to set for the rest of the flight deck to observe.

Antiairshowmouse

Tire Safety First

About a year ago when I first came to the Quality Assurance Division as an airframes QAR, the first safety problem I encountered was an improperly deflated tire. A safety violation report was submitted against the offender and training was held by the squadron, AIMD tire shop and supply drivers. For about four months everything was going smoothly until pack-ups from some ships came in with unauthorized deflation tags. It happened before and it can happen again. A good and properly held training course on TIRE SAFETY is effective only for three or four months. NAVAIR 04-1-10 and NAVAIR 04-1-506 are books to follow.

Let us not sit and wait until we hurt or kill somebody. Let us make TIRE SAFETY training a habit. Don't let anybody touch a tire without proper training. We can save some precious lives.

Tiresafetymouse

NAVAIR 04-10-56, Section 3, page 3-20, Figure 3-18 gives specifications on authorized tire deflation flags. — Ed.

What's Going on Here?

By Lt. Gregory H. Cooper
VS-30

THE first day of a three-day logistics mission went well. We transported people and ended up at NAS Agana, Guam, for the night. Day two of our mission had us flying passengers from Guam to Kadena Air Base, on Okinawa (a distance in excess of 1200 nm).

Prior to launch, our aircrewman did his usual excellent job of preparing our aircraft for flight while my copilot and I checked the notices, got our weather brief and filed our flight plans. The weather en route and at our destination was forecast as clear with a small headwind component at altitude and gusty crosswind conditions at Kadena. That meant we were set to go after our crew brief. We had more than enough gas to meet the requirements, were within the cross wind limits and were all experienced in the T-39.

The first thing that didn't go as forecast was the wind aloft. There was a much larger headwind component to contend with than expected. That didn't worry us much as we knew (after some quick computations) we still had plenty of fuel and figured we'd just be a little closer to minimum fuel upon arrival at Kadena. The remainder of the en route portion of the mission passed uneventfully with us periodi-

. . . So there we were, uncomfortably low on gas, and our destination was inundated with divert aircraft from an aircraft carrier operating in the vicinity. We had to make some important decisions, and make them quickly if we wanted to avoid an extremis condition . . .

cally checking fuel and making HF radio position reports.

After establishing both VHF and UHF communications with Naha control, we proceeded inbound under their control and were then cleared for en route descent to 10,000 feet. Our fuel-use figures had held up, and we had more than enough gas to be legal but we didn't have our usual "gravy." Passing 15,000 feet, we had the field in sight. We were handed off to approach control and received the unexpected word from a harried controller to arrest our descent, climb back to FL200, *turn away from the field,* hold until further advised and to expect a lengthy delay.

"Hey, what's going on here?", we said, almost in unison.

What we didn't know was that a carrier operating in the vicinity had unexpectedly diverted a large number of aircraft. They began to show up at Kadena only a few minutes prior to our arrival. Some of the divert birds were low on fuel and all were anxious to get safely on deck. Unfortunately, the first few aircraft to land blew their tires due to the crosswind. The airfield's windsocks were fully extended exactly 90 degrees from the runway heading with wind speeds up to 35 kts. Both of the field's parallel runways were closed while ground crews moved the affected planes. The ensuing field arrestments further increased the landing intervals. So there we were, uncomfortably low on gas, and our destination was inundated with divert aircraft. We had to make some important decisions, and make them quickly if we wanted to avoid an *extremis* condition. First we requested to hold at our present position. Then we shifted to a maximum endurance power setting at our present altitude. After several long minutes, we were finally advised to expect at least a 45-minute wait. At this point we declared "minimum fuel" to our controller and asked about the possibility of landing at a nearby Marine Corps helicopter field with a single 6,000-foot runway. We were advised that they were deluged with the overflow from Kadena as well and could not accept us anytime soon. At this point we weren't having fun anymore. We declared "emergency fuel," stated that we had 20 minutes remaining until splash. We were told we were *number eight* in priority behind other more fuel-critical aircraft. My copilot used one of our radios to contact both Kadena's and Futenma's tower to see if he could get any more information about the situation, while I edged closer to the air fields with our fuel needles continuing slow travel toward zero. After five anxious minutes, our controller came up and advised us that if we could proceed immediately to the Marine Corps field, we were cleared for a visual approach. That suited us just fine. Cross wind landing a light-loaded, transport on a short runway turned out to be a challenge. I put it firmly down on the upwind side of the runway. Keeping the aircraft tracking straight took all the aileron and rudder I had. Braking was normal, and once below 60 knots I engaged the nose wheel steering for directional control. My copilot fed me priceless information during roll out, such as aircraft speed and feet remaining on the runway.

After clearing the runway and parking our bird, no less than 10 other Navy divert aircraft landed after us. The crews said that they had had some anxious moments, too. We joined in their nervous laughter and camaraderie, called home base to check in with our story and made preparations for our next leg. Here are the things I learned from that flight:

Know exactly how much fuel you need at all times to complete your mission, then add a reserve for unforeseen contingencies. If you don't, you could end up out of gas and out of ideas at the same time.

Your crew has to be well-briefed and ready to handle anything. In our case we carefully discussed our intentions for our approach prior to descent and reacted as a team to the rapidly deteriorating situation. My copilot professionally handled radio comm by conveying our desires, verifying fuel estimates (mine and his) and helped provide valuable information throughout the many distractions which could have caused us to do something as insane as landing gear up while concentrating on our demanding landing situation. Our aircrewman was just as important in his calm and reassuring manner toward our passengers during our obvious machinations.

Don't docilely accept the unacceptable. OPNAV says you are responsible for your aircraft; you signed for it; take care of it (and yourself). If we had just done as we were originally told without questioning it, I'm not sure we would have stayed dry. You cannot unnecessarily disregard a controller, but you're the one airborne who has more to lose. When you need help, declare an emergency, work with your controller but do what you must to effect a safe result. ◄

Lcdr. Morris Meeker
Lt. Sam Bass
VF-202

During the initial run of a 2V2 dissimilar ACM engagement, south of Guantanamo Bay, Cuba, the crew of the F-4N experienced a hard burner light as power was set at combat thrust. Lcdr. Moe Meeker of Fighter Squadron TWO ZERO TWO quickly scanned his instruments and noted no abnormality. As the fighters engaged the A-4 adversaries, the right generator began cycling on and off. The pilot reduced power and the generator cycling ceased. As Meeker added power again, the generators cycled along with the stability augmentation and radar.

Lt. Sam Bass, RIO, turned off the radar as the pilot called a "knock it off" and secured the right generator. The flight lead, Cdr. Lawton Stevens, joined his wingman for a visual inspection. This inspection revealed large amounts of fuel gushing from the starboard engine aux air doors, nozzle area and aft fuselage. Meeker and Bass immediately completed the aft section fuel leak/fire in flight check list. Additionally, Stevens and Meeker secured the starboard engine of the aircraft. In view of the extreme fire potential, this timely action, although not a NATOPS procedure for an aft section fuel leak, propably saved the aircraft.

The active runway at NAS Guantanamo Bay was 10 with a wind of 150 degrees at 8 knots. This approach requires an abbreviated turn to final to avoid flying over Cuban airspace. Meeker requested a downwind landing on runway 28 to execute a single-engine straight-in approach. The 8,000-foot runway at GITMO is nearly minimum for an F-4 with single-engine, in that half flaps must be used, resulting in a significantly higher approach speed. An arrestment was ruled out because of the potential for sparks igniting the leaking fuel underneath the aircraft. Meeker executed a perfect single-engine landing. Turning off at the end of the runway, he shut down the good engine and the crew evacuated the aircraft.

Lcdr. Morris Meeker (left), Lt. Sam Bass (right).

BRAVO ZULU

From left to right:
AD1 Fred T. Roach,
Lcdr. Lucian N. Acuff
and Ltjg. James P. Webster

Lcdr. Lucian N. Acuff
Ltjg. James P. Webster
AD1 Fred T. Roach
HS-1

En route to NAF Mayport, Florida, to complete the low work portion of an H-2P checkride, aircraft commander Lcdr. Lou Acuff of HS-1 initiated a simulated single-engine failure for his copilot, Ltjg. Jamie Webster. The landing checklist was completed and both pilots of the SH-3G aircraft visually confirmed, "gear down and locked." Webster executed a flawless single-engine approach. On short final, both pilots reconfirmed the gear down and locked. With less than 20 knots ground speed, Webster smoothly touched down. Suddenly, the helicopter dropped left wing down as the port sponson settled toward the taxiway. Acuff remembered "looking over my left shoulder and seeing nothing but pavement!" The port main mount had retracted back into the sponson. Both pilots noted an unsafe gear indication and the crewman observed hydraulic fluid streaming from the port sponson area.

With the aircraft, which had only single-engine power, in an extreme left wing down attitude and the main rotor blades within inches of striking the ground, Webster reacted immediately by smoothly applying collective and right cyclic to bring the aircraft to a level attitude. Acuff then assumed control, called for full power on both engines and brought the aircraft into a stable hover. An attempt to blow the gear down over the taxiway was unsuccessful.

The decision was made to discharge crewman AD1 Fred T. Roach to visually inspect the aircraft for damage and, if possible, manually position and pin the collapsed gear in place. As the aircraft commander carefully hovered the aircraft with only its tailwheel on deck, Roach lowered himself from the cargo door. His visual inspection revealed damage to the forward anticollision light, ARA-25 antenna and minor damage to the port sponson. While the aircraft remained in a hover, Roach manually locked the port main landing gear drag link and pinned the gear. With the gear safely pinned, Acuff cautiously landed the aircraft and completed an uneventful shutdown. ◄

Thunderstorms and T-44s

By Lt. Russell Taylor
VT-28

THE preflight for our cross-country flight started at 0530 with a general look at the weather for our route of flight. Our first three-hour leg would be mostly in visual meteorological conditions (VMC). However, weather for the remainder of the planned route didn't appear too encouraging. There was one of those midwestern cold fronts that typically seems to sweep across the northern states at this time of year. The forecaster told us that with the thermal activity normally encountered during the day, this front would have the potential to generate some pretty good-sized cells.

Taking heed of this warning, I later told our passengers that we had filed a flight plan only to our planned refueling stop and that the possibility was very good that we would not make it to our final destination that day.

I decided it was a good idea to fly the first leg and make a determination whether or not to continue, based upon an updated forecast we would receive several hours later at our fuel stop. One possibility was to divert a few hundred miles to the west on the northern journey and come in from the "back side" of the front after it passed through our destination. This wasn't forecast to occur until approximately 1700 local time, which gave us three or four hours on the ground after our first leg.

The first leg was uneventful. The weather was so nice

. . . we were closer to a thunderstorm than I ever wanted to be.

that it was hard to imagine that several hundred miles to the north they predicted doom. After landing, the student and I went directly to the weather office. Indeed, thunderstorm activity was still forecast for our desired next stop but conditions were forecast to improve a little earlier than we first anticipated.

The latest weather information reported the front was a rather weak one and that thunderstorm activity didn't develop as intensely as predicted. I asked to take a look at a recent radar summary chart but, unfortunately, the weather office personnel told us that they never receive them on a timely basis, especially when they're needed most. I think Murphy's law applied to us here.

We decided to relax and have lunch at the golf course since there was no hurry in pressing on to the next stop. It would normally be only a two-hour leg, but the longer we would delay would mean less distance we would have to divert to the west. Also, the terminal forecasts improved dramatically for arrivals after 1600, and it was now only 1230.

After lunch we returned to the weather office just as a new radar summary was coming in. We were amazed to find a clear path of no *echo* returns several hundred miles wide directly between us and our intended next stop.

The forecaster explained that if we left soon, a straight shot through the middle would probably be our best bet. Since our aircraft had already been refueled, this seemed like an option too good to be true. Conditions were forecast to be VMC for most of this proposed leg with a chance of some layered cirrus at altitude. Conditions possibly still being favorable for thunderstorm development, the "few" block (3 percent to 15 percent) on our weather brief form we checked, along with a note, "Chance of thunderstorm development in central Illinois." Light-to-moderate turbulence would be expected in this area between FL180-FL340 for our aircraft with no icing and intermittent light-to-moderate rain showers at only our destination.

Following a visual check of the fuel tanks, engine compartments, etc., we departed soon afterward. Thirty minutes out, we detected a cell approximately 80 to 100 miles in line with our flight path and a few others at our 10 o'clock position that weren't any factor to us. I turned on the radar to the 160 nm scale and both cells were painted sharply on our screen. As we approached the one in front of us, our request to divert five miles to one side was approved with a recommendation to the west. Passing beside this isolated cell, we could see that it was still developing.

Looking ahead now, we could see a few more storms starting to pop up along with some cirrus that lay right at our flight level. Scanning the radar scope, I now noticed that no echo returns were being displayed. I knew this information was erroneous because there were now a few CBs ahead that should have given us a healthy return. We descended to FL190 to remain VMC below the cirrus layer, but it was obvious now that the weather was quickly deteriorating.

I then advised center that our weather radar wasn't functioning and that we would like a 180-degree turn and fly a reverse route. His reply was that weather behind us now was deteriorating rapidly and we were already halfway through. He also mentioned that other aircraft were picking their way through, and our path of flight looked to be the best option available.

The tension started to build as I was forced to decide whether to press on or reverse course. Since we didn't have operable radar, I felt as though we were at the mercy of the controller. We accepted a vector from him that would take us a little off course, but according to his radar, the returns in that area weren't so bad.

We then entered instrument conditions and continuous light, moderate turbulence. The airwaves were now busy with chatter from other pilots requesting vectors like ourselves or deviations for weather avoidance. Our controller's workload seemed to increase dramatically. I knew he couldn't possible give us the attention we desired or needed.

We started to pick up light icing and then hail. Realizing then that we were much closer to a cell than I wanted to be, I told my student to turn 180 degrees at 30 degrees angle of bank. Now in moderate turbulence, I didn't want to turn too steeply and possibly lose control. There were several flashes of lightning around us and the feeling I had surely wasn't one of comfort.

After what seemed like an hour, but was actually only a few minutes, we broke out in VMC conditions again to find ourselves in an oval airspace approximately 50 miles across and surrounded by CBs and darkened skies. I advised center that we would be holding in this area and needed a few minutes to plan an approach to an airport in our immediate vicinity. The only suitable airport had an ILS approach and was only 20 nm from our position. However, we could also see a cell in close proximity to that airport, and I felt an approach at that time would be risky.

We held for about 15 minutes, waiting for the thunderstorm to pass to the east, thus allowing us to make an approach. During that period, a broadcast advised all aircraft that a WW had been issued for an area that

encompassed our present position. That was obvious and I had to laugh to help relieve the tension from what we had just been through.

This area of clear airspace was now starting to diminish, and the cell sitting over the airport didn't appear to budge an inch. Again, that uneasy feeling began to creep into my stomach.

The controllers again called us and advised that a business jet had a smooth ride along a radial that wasn't far from our position. He was at an altitude close to ours and encountered only light rime icing and light turbulence. I decided to follow in his path and again accepted a vector from center to intercept this course. The sky ahead of us was dark, but I knew that shadows from the cirrus layer above probably had an impact on its shade.

Again, we were in IMC conditions with light icing, no radar and at the controllers' mercy. We set turbulent air penetration speed as before because we couldn't see what lay ahead.

This time was different, however. There was only occasional light chop and after only five or 10 minutes, we broke out and could see for many miles. Only 20 minutes from our destination, we knew it was all behind us now.

After landing, I went directly to the weather office to find out why I wasn't given a more accurate forecast of conditions encountered en route. The reply was that nobody really expected severe thunderstorms to develop as they did in that area, and the fact that the whole area went sour within an hour's time left a lot of aviators wondering, "What am I doing in a place like this?"

From this experience, I learned several things:

1. Thunderstorm conditions and T-44s don't mix. (I knew this all along, but it was emphasized so dramatically that I'll never forget it.)

2. Weather radar is nice to have (when it works) but I'll never *depend* on it to "pick my way through" bad weather if I have the option not to fly through it at all.

3. Finally, student naval aviators aren't afraid of anything. After hearing comments like "that was neat . . . I've never done that before," I realized that many students must think instructors are gods. Gods, like students, aren't afraid of anything, but that experience sure scared the heck out of *me*. ◄

Jet Training Days

By Ltjg. James W. Galanie
VA-27

AFTER completing primary flight training, I was ecstatic about my orders to basic jet training. Arriving at NAS Meridian with my new "go fast" flight gear in tow, I was eager to begin pulling Gs and learning carrier landing techniques. But first there was the mountain of ground school, NAMTRADET, simulators, NATOPS tests, procedures, course rules and lectures that lay between me and flying that T-2C jet.

Finally, it was my turn to fly that first back seat instrument hop. After an extensive brief, we manned up. The plane captain strapped me in the back seat while my instructor completed all the prestart checks at an amazing speed. Soon we were lined up on the duty runway, instrument hood in place, engines at MRT and a loud chorus of hot mike, heavy breathing in our ears.

Our instrument takeoff went as briefed; rotate, gear up, flaps up, accelerating through 200 KIAS "you've got it." Here I was, finally flying a Navy jet when, five seconds later: BANG! and the left engine RPM gauge began winding down. I sat there with my left hand pushed to the firewall and told my instructor that we had a left engine failure, for I had seen this before in the trainer.

He had already analyzed the situation as a probable bird strike, immediately took command and began climbing to a right high key for a precautionary single-engine approach. I pulled out the pocket checklist and read the procedures for securing a failed engine and executing a single-engine approach while my instructor shut down the bad engine and set up for the precautionary approach to a flared landing.

Postflight inspection revealed the aircraft hit a five-pound hawk on the bottom side of the nose cone. Bird guts, feathers and blood were splattered in the baggage compartment; the left engine sustained catastrophic FOD damage and the remaining engine was partially FODded. Engine borescoping estimated a maximum of five more minutes of sustained thrust.

I was fortunate with my first emergency, but the "what ifs" plagued my mind. The first one considered the possibility that the bird strike might have hit the canopy instead, incapacitating my instructor and leaving me on my own to land a potentially stricken aircraft from the rear seat. I'm convinced that the required simulator training would have provided me with the ability to fly a GCA into a short field arrestment.

But the other question that concerns me most is the possibility that both engines may have failed with my instructor incapacitated in the front seat. Sounds simple — EJECT! However, it is SOP for the instructor to position the command eject lever where he can eject both seats by pulling his handle. With him in front, my ejection would have left his seat in the airplane. Given the above circumstances, I wonder if I would have had the situational awareness to switch the command eject lever to the rear seat priority position prior to "punching out" myself and an incapacitated instructor, or would I have left the handle in its preflight position and left behind the stricken aircraft and a doomed instructor? I'll never know the answer, but this first jet flight is one I'll never forget. ◄

After Flight

By Lcdr. Jim Kline
VAW-121

THE wail of the sirens cut through the stillness of the early morning. Flashing red and blue lights seemed somehow softened by low-lying mist. A group of vehicles had assembled around a scarred section of woods just off a back road. People can be seen running and shouting as they search through the twisted and smoking remnants of what had earlier propelled its occupant through time and space. Two ambulance attendants are there, slowly zipping up the oblong bag containing what was once a highly experienced, professional aviator.

What had gone wrong? Material failure? A violation of NATOPS? Pilot work overload? Fatigue? How about a more subtle form of disaster — the emotional letdown that follows challenging flight evolutions?

It had all started out well enough. FCLPs at the OLF from late evening until early morning. He did well. Eight passes — mostly OKs. He went into a potentially dangerous environment and pumped himself up emotionally to overcome fatigue and to really concentrate on flying the ball. He knew how hard he would have to work and forced himself to overcome the obstacles.

When he walked away from the LSO debrief, he felt pretty good. He was *done*. After all, he conquered fatigue, challenged the skies, braved the LSO's pencil and had been a winner. His mind began to unravel, and visions of a tall cool one and a comfortable bed flashed through his head.

He smiled contently to himself as he approached his mount for the trip home. The light from the commander's moon enhanced the graceful, cat-like lines of his pride and joy. He spent a lot of time and money on that baby and he knew what she'd do. The curvy two-lane country road home would be a pleasure tonight. He'd driven that road enough — even when the morning mist shrouded some of the turns — it was fun, but certainly no challenge.

He drove very gently at first. It took a while to come up to operating temp, and he was, after all, a professional "driver." Periodically, the satisfying visions of things to be done at home returned. A yawn could not be stifled. He noticed how really comfortable he was. The gentle, soothing tunes emanating from the dash accelerated his mental unwinding.

He casually noticed the forming pockets of heavy mist but dismissed them as not worthy of his attention. He set himself up a little faster than normal going into the long, sweeping turn past the old church. The car slid a little, but by judicious use of throttle, he corrected, only to accelerate a *lot* faster into the next bend. The fog and fatigue distorted his depth perception. At this point he failed to negotiate the turn. A farmer heard the crash and saw the flash of the exploding gas tank from his bedroom window; he summoned the rescue vehicles.

It is a normal human reaction to "unwind" emotionally after surviving what is perceived as a "large" challenge, only to be bitten by a "small" or routine one. The statistics prove that driving is more dangerous than flying. Don't allow yourself to lose your "edge" until your car is put away for the night and the tall cool one is in your hand. Give your driving the concentration it requires so that this scenario will never apply to you. ◄

Privileged Information in Aircraft Accident Investigations

The Significance of U.S. vs. Weber

By Russel B. Bromberger
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THE Supreme Court of the United States, in a unanimous vote of 9-0, upheld the principle of safety privilege in aircraft mishap investigations in a landmark case, *United States vs. Weber Aircraft Corporation*, handed down March 20, 1984.

The basic idea of safety privilege, as stated in OPNAVINST 3750.6N, "The Naval Aviation Safety Program," is that ". . . the statements given aircraft mishap investigators, the information developed by aircraft mishap boards, the information submitted in mishap investigations, report endorsements and certain extracts from mishap investigation reports *are privileged*, in that they shall be used *only* for safety purposes."

OPNAVINST 3750.6N was not before the courts in the *Weber* case; the dispute concerned the comparable Air Force authority document on safety privilege, A. F. Reg. 127-4, which provides for a safety investigation intended for the "sole purpose of taking corrective action in the interest of accident prevention."

Weber is the first case involving armed forces aircraft mishap investigation reports to be decided by the Supreme Court. Previous U.S. District Court and Courts of Appeals decisions had generally supported the principle of safety privilege until a circuit court ruled in favor of Weber Aircraft's request for safety information in late 1982; the government refused to provide Weber with the Air Force safety report and asked the Supreme Court to review the lack of consistency in circuit court decisions. The government's brief, filed by the Solicitor General of the United States, noted two Navy cases in which safety privilege had been upheld by two different circuit courts.

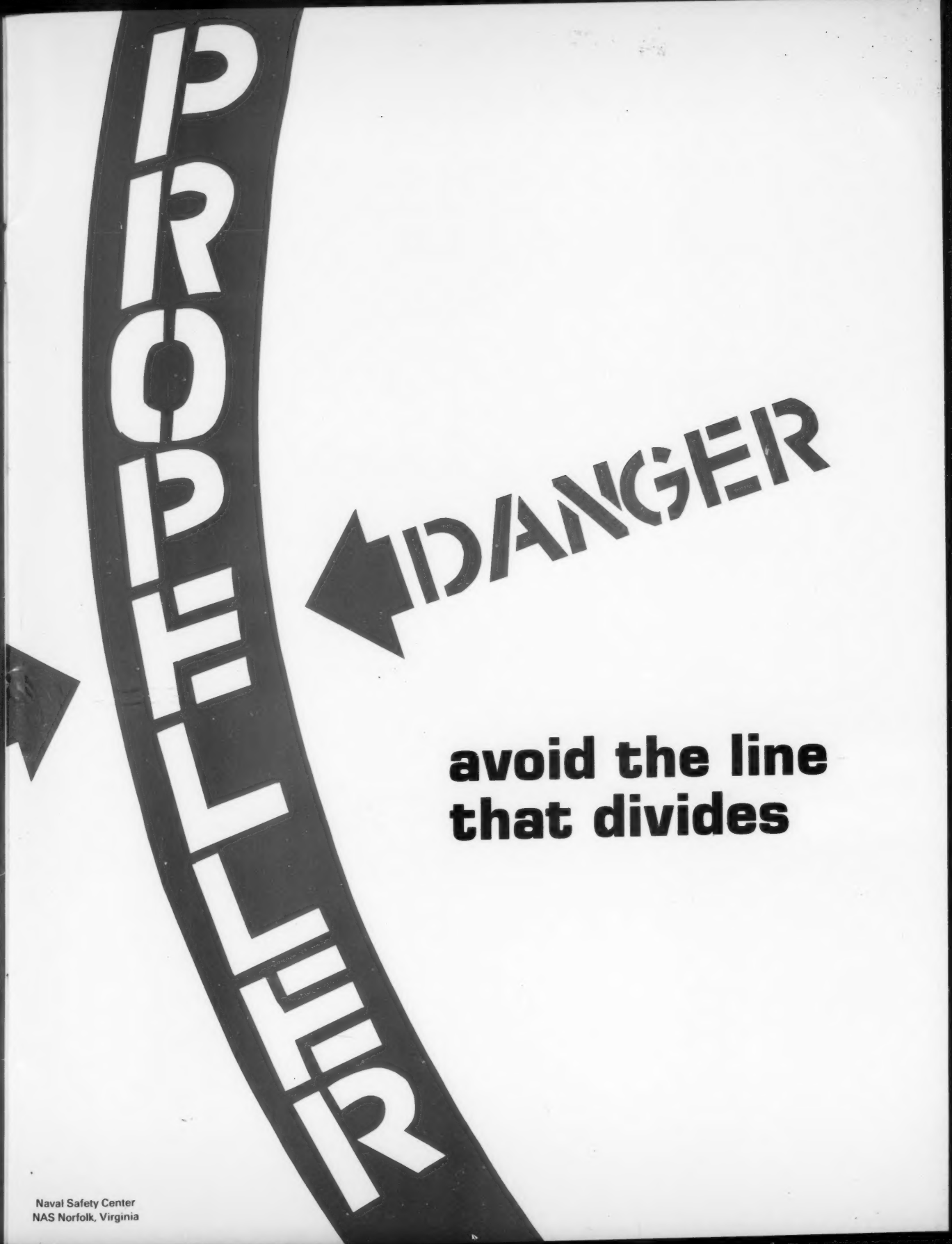
The decision in *Weber* appears to contain language wide enough to include aircraft mishap investigations conducted by all the armed forces as integral parts of their aviation safety programs since the mid-1950s: "Confidential statements made to air crash safety investigators were held to be privileged . . . over 20 years ago." As previous authority, the Supreme Court approved the appellate court case *Machin vs. Zuckert* (1963) and referred to armed forces aircraft safety investigations as covered by the *Machin* privilege, which the Supreme Court said "is well-recognized in the case law."

In *Weber*, the Air Force filed a sworn statement asking approval of the use of safety privilege to protect "conclusions, speculations, findings and recommendations made by aircraft mishap investigators" as well as "testimony presented by witnesses under a pledge of confidentiality." The Supreme Court's decision states that the items in question were protected under the *Machin* privilege.

Much of the argument before the Supreme Court in *Weber* was about whether material under the protection of the *Machin* privilege, now more than 20 years old, is still protected from mandatory disclosure under the much more recent Freedom of Information Act (Title 5, United States Code, Section 552). The Supreme Court resolved that issue by holding that the material protected under the *Machin* privilege falls within Exception 5 (intra-agency or inter-agency memorandums or letters which would not be available by law to a party other than an agency in litigation with an agency), and thus is not affected by the Act.

The Supreme Court's approval of safety privilege in *Weber* allows the armed forces to continue conducting safety investigations in a manner that assures witnesses and mishap boards that their statements and deliberations continue to be protected. Benefits from the practice were described in an Air Force affidavit in *Weber*, quoted by the Supreme Court in a footnote to its decision:

> "If aircraft mishap investigators were unable to give such assurances or if it were felt that such promises were hollow, testimony and input from witnesses and from manufacturers in many instances would be less than factual and a determination of the exact cause factors of accidents would be jeopardized. This would seriously hinder the accomplishment of prompt corrective action designed to preclude the occurrence of a similar accident. This privilege, properly accorded to the described portions of a United States Air Force Mishap Report of Investigation, including those portions reflecting from deliberations of the Investigating Board, is the very foundation of a successful Air Force flight safety program."



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WANT TO KEEP YOUR WINGS?

CHECK YOUR LINE UP!